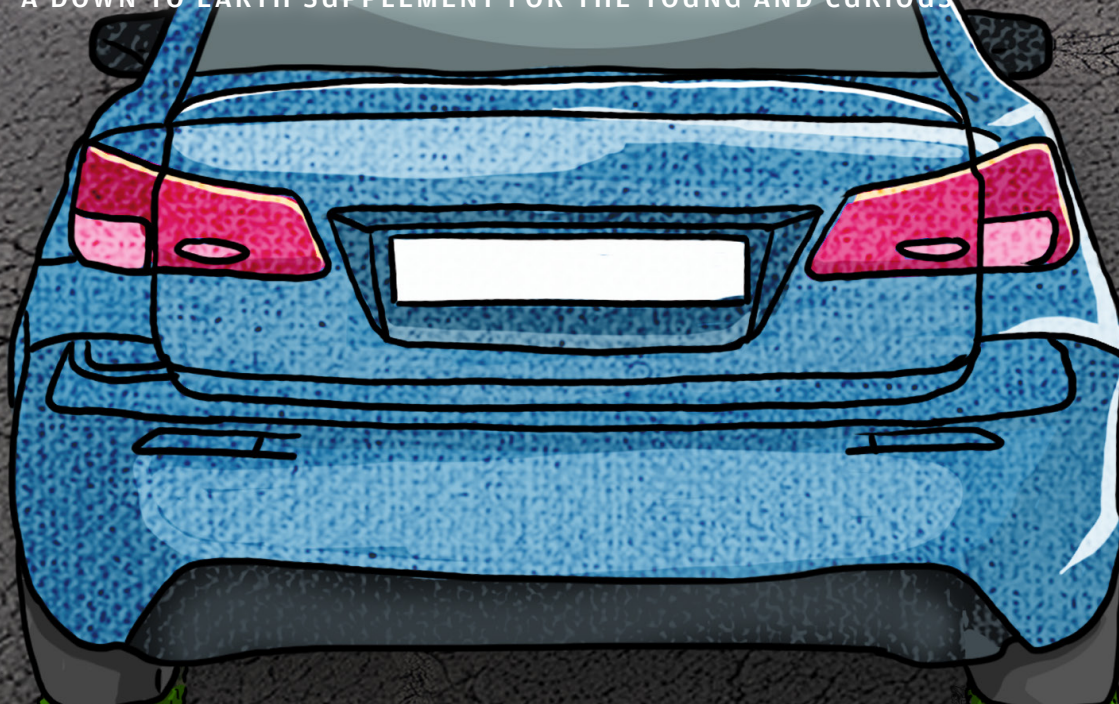


gobar times

Issue no. 275, April 1–30, 2025

A DOWN TO EARTH SUPPLEMENT FOR THE YOUNG AND CURIOUS



Green Wheels Ahead

Zoom into the electric future—how EVs work, their ups and downs, and what makes them so special.

Coverstory



WATT A RIDE!



**Moushumi
Mohanty**

Can electric cars outride conventional cars in India? Discover how EVs are changing the way we move.

Supplement Editor: Souparno Banerjee **Senior Creative Director:** Ajit Bajaj **Supplement Editorial Coordinator:** Anubhuti Sharma **Design:** Ritika Bohra **Illustrations:** Yogendra Anand **Cover Design:** Ritika Bohra **Production:** Rakesh Srivastava, Surender Singh
Email: young@dwntoearth.org.in **Snail Mail:** Centre for Science and Environment, 41, Tughlakabad Institutional Area, New Delhi-110062

Who killed the electric car?" That's a movie

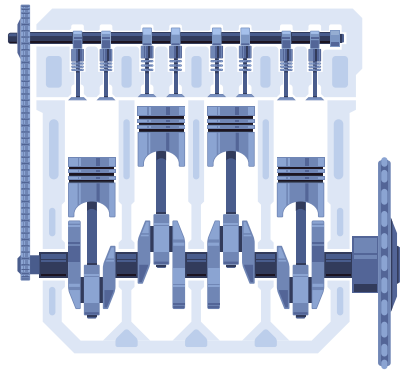
released by Sony Pictures at the Sundance Film Festival on 28 June, 2006. Watch it when you're on a screen next time. The movie is about the General Motors EV 1 car which was available in California in the mid-1990s after the California Air Resources Board passed a rule called the zero emission vehicle mandate. A zero emission vehicle is one that does not emit exhaust gas or other pollutants when it is running.

For something to be killed, it must be alive once. You guessed right. There is nothing new about electric vehicles. They have been around for a while. In fact, the first real electric car was built in 1884 by English inventor Thomas Parker. Before that, several types of crude electric carriages existed in the 1820s and 30s.

But they were not as common then as they are now. So, what are electric vehicles? Why are they called electric vehicles? The answer to that question is simple. They run on batteries! Much like our phones and laptops. In comparison, the conventional cars and scooters run on engines, or internal combustion engines (short form – ICE).

How are EVs heartless?

Is that the only difference between electric and ICE vehicles? They are actually very, very different. The heart of an ICE vehicle is an engine. Whereas EVs don't have a heart and they run on a battery and a motor. Can they be called heartless then? But is that a bad thing? Most certainly not.



Internal combustion engine is a heat engine where petrol/diesel and air are burned inside a small chamber to create a high-pressure gas mixture which drives the engine's moving parts. The parts, in turn, drive the vehicle.

Since EVs do not have an engine, they have no emissions, whereas ICE vehicles release loads of fumes from their exhaust pipes which leads to air pollution.

EVs are far more efficient than ICE vehicles. This means they can convert a higher percentage of energy into usable power to move the vehicle. ICE vehicles are less efficient and lose a lot of energy as heat and friction.

Electric vehicles are much simpler in design. ICE engines typically have hundreds of moving parts and are more complex while EVs have a much simpler design with about 20-30 moving parts. In fact, you can make one yourself.

With so many moving parts, ICE vehicles experience more wear and tear, which

means they require regular maintenance, and sometimes, even repairs that are costly. In comparison, electric vehicles make fewer trips to the service centre and have longer lives.

Quiet as an Owl's Flight

EVs are quiet and far smoother to drive. ICE vehicles experience more noise and vibration, especially when they accelerate. In fact, EVs are so unusually quiet that automakers are working on creating fake engine sounds to make them noisy. This will not only help drivers feel they're driving a real vehicle, it will also help with pedestrian safety. Often, pedestrians do not hear an electric vehicle, especially when there is other road noise, and don't move out of the way. This leads to accidents. For pedestrian safety, some countries have regulations mandating that all EVs must emit sound at low speeds. The Automotive Research Association of India (ARAI) is developing a new vehicle alert system for the purpose.

If EVs are so great, why doesn't everyone buy them?

There's a catch there. EVs have imperfections.

Cost: EVs are far more expensive than ICE vehicles. For example, the price of a Tata Nexon car starts at Rs 9 lakh, while its electric version is priced at almost Rs 15 lakh. Insurance premium (big word alert!) for the ICE version is Rs 36,000 while the electric version's premium is Rs 60,000. Since the upfront cost of EVs is high, the government has been trying to reduce its cost with incentives to make it

affordable. In some countries, like Norway, the ICE vehicle has such high taxes that EVs turn out to be cheaper!

Difficult to charge: Since EVs run on batteries, they have to be charged like phones and laptops. The problem is that there are not enough public charging stations. Most people charge at home. But if they are outside and their battery needs a quick top up, there have to be enough charging points around. Battery usage is typically dependent on weather, vehicle weight, tyre condition and battery health, among others. If it's too hot and the AC is turned on at full blast, the battery will likely be spent earlier than it would otherwise. If it's too cold and

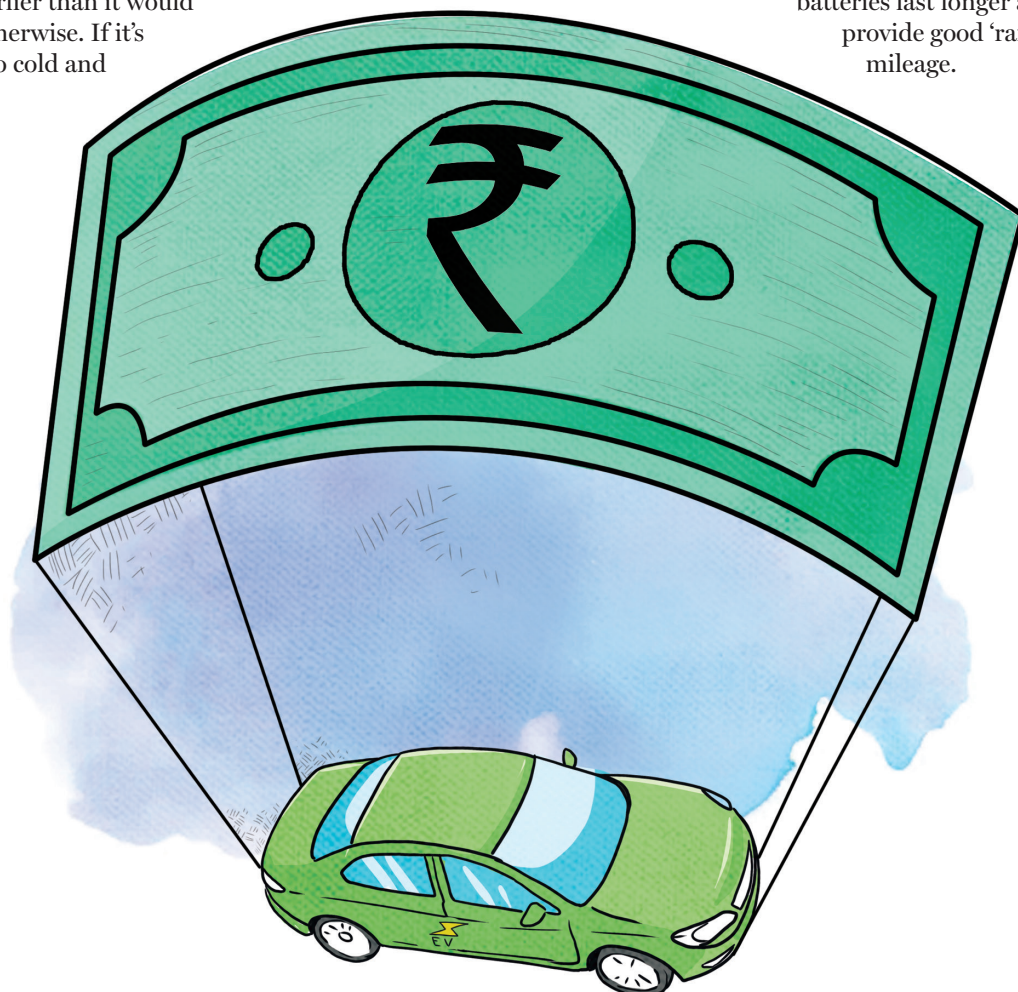
However, there are not enough charging points around so EV drivers have to plan their day with a lot of care to ensure that they are not left on the road with a depleted battery.

the driver has to run the heater, it too has a similar effect on the battery. This happens in ICE vehicles as well. But when fuel is needed for an ICE vehicle, there are plenty of filling stations to get to. With EVs, that is not the case. EV drivers have to plan their day with a

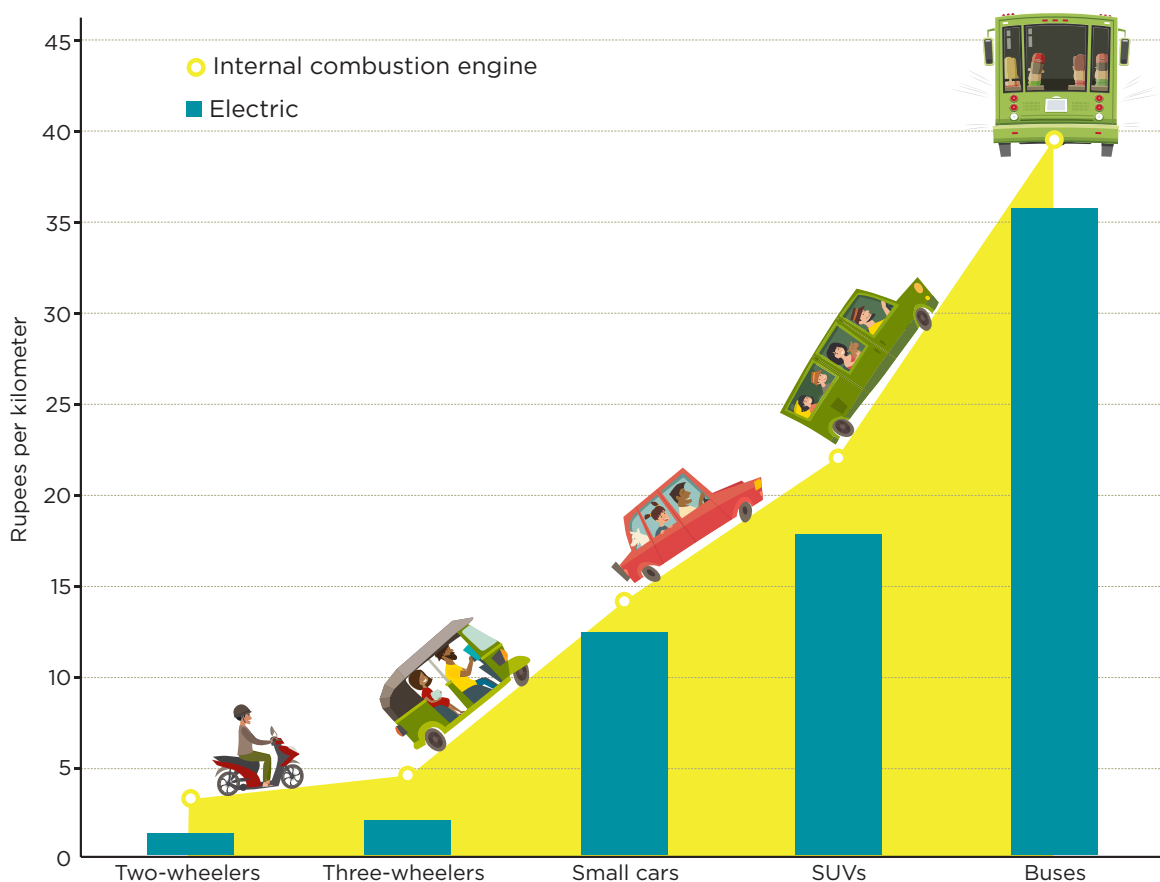
lot of care to ensure that they are not left on the road with a depleted battery.

Heavy vehicles require more power to move and that power is drawn from the battery. Similarly, a worn out tyre will always use more energy, thus depleting the battery. In addition, as batteries grow old, they lose their capacity to get charged fully and they may require more energy to operate.

Bad roads don't help: Driving uphill or on rough roads requires more energy than driving on flat and smooth roads. It is useful to choose efficient routes that can help use minimum battery. This type of conscious driving can help batteries last longer and provide good 'range' or mileage.



Total cost of ownership of battery-electric versus Internal Combustion Engine vehicles



Sources: BloombergNEF. Note: SUV is sports utility vehicle. The Total Cost of Ownership (TCO) of electric two- and three-wheelers are the averages of all subsegments. The TCO of internal combustion engine vehicles are averages across the most prevalent fuel types in the segment (such as compressed natural gas, petrol and diesel).

If they're such a problem, why should we buy EVs?

EVs are not only good for the environment because they generate zero emissions and can help make the air cleaner. They also have lower running costs. Charging an EV is far cheaper than filling an ICE vehicle fuel tank.

To understand this better, let us imagine we have two cars. One is an electric vehicle, like Tata Nexon EV, and the other is a petrol version of the same car. The EV has a 35

kWh battery that can cover an average distance of 60 km/day (stay focused!) on a single charge. The petrol version has a 44 litre fuel tank and can run 17 km/litre.

Hypothetically, if the charging rate of the EV costs Rs 10 per unit of electricity, then the per kilometer cost would be around Rs 1.10. In comparison, the petrol version might cost Rs 6.60 per km. This means running an EV is far cheaper than running an ICE vehicle.

With low operational costs, the money spent in buying the vehicle effectively pays off if you use it regularly. Think about it, EVs don't make any noise, don't cost much in maintenance and offer an incredibly smooth ride. Don't they sound a lot better than the petrol or diesel cars we have on our roads?

The author is a Senior Programme Manager in the Clean Air Programme of the Centre for Science and Environment, New Delhi



Chhavi Mathur

MIYAZAKI MAGIC

Entering the weird, whimsical, and enchanting world of nature in Studio Ghibli movies

Before I ever learnt about environmental problems such as habitat destruction, pollution, or climate change, the natural world was a space of wonder and enchantment. Growing up in a valley away from cities, it was easy for me to lose myself to hours of sitting outside, playing in the sand, and watching the movements of insects, birds, and other animals. Walks to a nearby forested hill had endless potential for adventure, discovery, and magic. Some of this magic came from an overactive

imagination—the little opening through vines and creepers onto a barely visible forest trail was obviously the secret entrance to a hidden kingdom! Some of it also simply came from the feeling of being part of a world that was full of familiar, yet strange, beautiful, and vibrant life.

The experience of watching a Studio Ghibli animated film, directed by Hayao Miyazaki, recreates this sense of magic for me, while also making me think deeper about our relationship with the environment and other living creatures.

My Neighbour Totoro (1988), one of Studio Ghibli's most iconic movies, tells the story of two young girls, Mei and Satsuki, who have just moved to a country house by the forest with their father, to be closer to the hospital where their ill mother is admitted. The sisters soon encounter their neighbourhood forest spirits, the whimsical trio of a gentle and giant creature they name "Totoro", and his two little friends. The film sensitively touches on some difficult subjects and emotions, such as dealing with grief, pain, and the uncertainty of a crisis. Nature here forms a space for comfort, healing, and playful wonder. While it is only the kids who can see all the fantastical spirit creatures of the forest, the adults in the village also accept the existence of, and even revere, the spirits and life force that keep the forests around them healthy. This is a



Totoro snoozes peacefully in his forest home from the movie 'My Neighbour Totoro'



Nausicaa soars above a mighty Ohm in 'Nausicaa of the Valley of the Wind'

charming and wholesome movie that evokes, from a child's eye view, the joy and abundance that nature has to offer.

Nausicaa of the Valley of the Wind (1984), one of Miyazaki's earliest films, is set in a post-apocalyptic world left by an industrial human civilization in the past. Human communities are threatened by and at war with the spreading "sea of decay", a toxic, fungal forest in which hordes of massive, deadly insects live. Unlike animals in many animated films that are made to look cuter or even talk and behave like humans—think of movies like *The Lion King*, *Madagascar*, or even *A Bug's Life*, which is about insects—Miyazaki doesn't give viewers any such easy way to relate with or love these creatures. There are weird, winged centipedes, whirring locust-like creatures, and a huge beast called "Ohm" with a spiky armoured shell, several crawling feet, and multiple beady eyes—pretty creepy, right?

Despite knowing their dangers, the heroine of the film, Princess Nausicaa, is still curious to learn more about the role these insects and plants of the forest play in their world's ecosystem. In her eyes, there is immense wonder and beauty even in the toxic plants. She sees the insects not as monsters, but as fellow living beings who also feel pain, fear, and kinship. In a world that pits humans against insects and forest, can Nausicaa show a different possibility of coexistence and friendship across species? Watch the movie to find out!

Princess Mononoke (1997) is not only one of Miyazaki's most epic films, but also the most explicitly environmentally themed. Drawing inspiration from elements of Japanese myth and folklore, the natural world in the film is animated by many strange and curious spirits, while powerful animal gods give a voice to the creatures of the wild. The film

stages ecological conflict in the form of an actual battle between the human and natural world. At the edge of a great forest, a human industrial settlement, known as Iron Town, wishes to exploit it for its material resources, causing the nature gods and spirits to fight back.

The sharp line between the human and natural world is, however, ruptured by two central characters, San and Ashitaka. San, or Princess Mononoke, is a girl with a wolf family, whose loyalties lie firmly with the creatures of the forest. Ashitaka is a young man from a distant village who seeks a cure from the forest for a cursed wound inflicted on him. His task is to see with "eyes unclouded by hate". Through him we witness both the beauty and magic of the forest world, as well as the spunk, heart, and tenacity of the workers of Iron Town, a community made up almost entirely of outcasts and marginalized populations of human society. While *Princess Mononoke* does not give us any cookie cutter villain characters, it tells a fascinating, nuanced and thought-provoking tale with a strong environmental message.

So, if you have a concern for the environment or want to simply experience the enchantment of nature onscreen, do not miss these Studio Ghibli movies!

The author is a Sub-editor in the Books Publications Team, Centre for Science and Environment, New Delhi



Tree spirits watch silently from the woods in 'Princess Mononoke'



HOW INDIA MOVES TOWARDS IT'S FINAL DESTINATION

How do people get to work in India? People use all kinds of ways: walking, cycling, riding scooters and mopeds, driving cars and jeeps, taking autos, buses, taxis, metros, trains, and even tempos! Some people even work from home. The way people travel differs a lot between cities and villages. Here's a surprise from **The State of India in Figures 2025**, released by the Centre for Science and Environment: More people walk to work in cities than in villages! In cities, 2.6 crore people walk to work, while in villages, it's 1.8 crore.

Ritika Bohra/GT